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09/635,431	08/10/2000	Takeshi Hoshida	1460.1007	6994

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EXAMINER	
CUNNINGHAM, STEPHEN C	
ART UNIT	**PAPER NUMBER**
3663	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/635,431	HOSHIDA ET AL.
	Examiner	**Art Unit**
	Stephen C. Cunningham	3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 09 February 2003 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-45 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-45 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3, 4, 17, and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Rejection is pursuant to claims as amended in paper 10, entered on 12/10/02.

Claim 1, line 3, states "average optical per signal wavelength".

Claim 3, line 3, states "average optical per signal wavelength".

Claim 4, line 4, states "average optical per signal wavelength".

Claim 17, line 3, states "average optical per signal wavelength".

Claim 18, line 4, states "average optical per signal wavelength".

The claim fails to state the average of what. The examiner will treat the claims as referring to power. –average optical power per signal wavelength--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 3, 5, 14, 15, 42 are rejected under 35 U.S.C. 103(a) as obvious over Ma et al. (6,151,160) in view of Berger et al. (6,088,152).

With respect to claim 1, Ma et al. teaches amplification in a parallel band amplifier comprising:

a plurality of optical adjusting means adjusting the average power per wavelength; and

wavelength multiplexing means (figure 4).

Ma et al. fails to teach controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter-wavelength-band light becomes larger than an output of adjusting means for adjusting optical power of longer-wavelength-band light.

The as amended claim states "adjusting average optical per signal wavelength channel of light beams" understood for examination as –adjusting average optical power per signal wavelength channel of light beams-- is further understood to indicate the power of each light beam. The average power per (of each) light beam is the total light beam power, of the considered light beams one, divided by number of light beams considered. In this case, there is only one beam considered so the average power is equal to the power of the considered light beam. The issue regarding the average power per signal wavelength arises repeatedly throughout the claims, specifically claims 3, 4, 16, 17, 18, 29, 30, 31,

37-43, 45. This interpretation is applied to each instance however the explanation of the interpretation will not be repeated.

Berger teaches controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter-wavelength-band light becomes larger than an output of adjusting means for adjusting optical power of longer-wavelength-band light (column 1, lines 49-56; column 2, line 4; and figure 1). It would have been obvious to modify Ma et al. in view of Berger et al. by using low noise Raman amplifiers and introducing control means, of Berger, to in order to compensate for the effects of Raman scattering and wavelength dependent loss in the transmission line.

With respect to claim 3, Berger teaches controlling means for controlling the outputs of said respective optical adjusting means so that average power per wavelength of the respective wavelength bands at a predetermined point will become approximately identical when output light of the wavelength-multiplexing means travels to the predetermined point (column 1, lines 51-56).

With respect to claim 42, Ma et al. teach an optical amplifying apparatus comprising:

a wavelength demultiplexing unit that demultiplexes signal light into respective bands;

a plurality of optical adjusting units that adjust average optical power per signal wavelength channel; and

a wavelength multiplexing unit to multiplex the outputs of the adjusting units (figure 4).

Berger et al. teaches an optical amplifier comprising a control unit that controls the optical adjusting unit so that the average optical power per single wavelength of shorter-wavelength-band light is larger than the average power per single wavelength of longer-wavelength-band light. (column 1, lines 49-56; column 2, line 4; and figure 1). It would have been obvious to modify Ma et al. in view of Berger et al. by using low noise Raman amplifiers and introducing control means, of Berger, to in order to compensate for the effects of Raman scattering and wavelength dependent loss in the transmission line.

With respect to claim 43, Ma et al. teach an optical amplifying apparatus comprising:

an optical sending device to generate optical signal light of a plurality of wavelength bands;

an optical receiving device to receive and process the optical signal light transmitted through the transmission line (figure 2); and

and optical amplifier comprising:

a wavelength demultiplexing unit that demultiplexes signal light into respective bands;

a plurality of optical adjusting units that adjust average optical power per signal wavelength channel; and

a wavelength multiplexing unit to multiplex the outputs of the adjusting units (figure 4).

Berger et al. teaches an optical amplifier comprising a control unit that controls the optical adjusting unit so that the average optical power per single wavelength of shorter-wavelength-band light is larger than the average power per single wavelength of longer-wavelength-band light. (column 1, lines 49-56; column 2, line 4; and figure 1). It would have been obvious to modify Ma et al. in view of Berger et al. by using low noise Raman amplifiers and introducing control means, of Berger, to in order to compensate for the effects of Raman scattering and wavelength dependent loss in the transmission line.

With respect to claim 44, Ma et al. teach a parallel type optical amplifier. Berger teaches an optical amplifier wherein the control means perform control based on an average output power per single wavelength channel such that the shorter wavelength channels receive a higher power than the longer wavelength channels. It would have been obvious to modify the apparatus to compare the averages per channel power of the bands associated with respective adjusting means in order to pre-emphasize across the full range of the transmission spectrum.

With respect to claim 45, Ma et al. teach a parallel type optical amplifier. Berger teaches an optical amplifier wherein the control means perform control based on an average output power per single wavelength channel such that the shorter wavelength channels receive a higher power than the longer wavelength

channels. It would have been obvious to modify the apparatus to compare the averages per channel power of the bands associated with respective adjusting means in order to pre-emphasize across the full range of the transmission spectrum, specifically to pre-emphasize the signal spectrum such that the shorter wavelength channels and the longer wavelength channels power compensate for Raman shift in the transmission line.

2. Claim 2, 6, 7, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. in view of Berger et al.

   Ma et al. fails to teach to teach controlling means. Berger teaches controlling means that determine a difference between the outputs of optical adjusting means for adjusting the optical power of shorter-wavelength-band light becomes larger than an output of adjusting means for adjusting optical power of longer-wavelength-band light (column 1, lines 49-56; column 2, line 4; and figure 1).

   With respect to claims 37 and 38, this is the inherent method by which amplification is performed.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berger in view of Saeki (5,896,221), or in the alternative Ma et al. in view of Berger and further in view of Saeki.

   Berger fails to teach eliminating noise powers. Saeki teaches controlling the adjusting stage utilizing powers calculated by subtracting noise powers from average optical power per signal wavelength channel. It would have been

obvious to modify the device by subtracting noise power from the signal power in order to more precisely control signal gain (figure 1).

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. in view of Berger, as applied to claim 1 above, and further in view of Toyohara.

Ma et al. in view of Berger fails to teach an increase or decrease in the number of channels in a WDM signal. Toyohara teaches a device where the number of channels in a WDM signal are increased or decreased. It would have been obvious to modify Berger's device to account for an increase of a decrease in the number of channels in a WDM signal in order to maintain gain flatness in communications system.

Ma et al. in view of Berger fails to teach an increase or decrease in the number of channels in a WDM signal. Toyohara teaches a device where the number of channels in a WDM signal is increased or decreased. It would have been obvious to modify the device to account for an increase of a decrease in the number of channels in a WDM

5. Claim 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berger in view of Itou, or in the alternative Ma et al. in view of Berger and further in view of Itou.

With respect to claim 10, detecting means at a predetermined point where powers of the respective wavelength bands become approximately identical has

not been taught. Itou teaches detecting means at a point where the respective wavelength channel powers become approximately identical. Channels are a species that anticipates the bands genus (abstract and figure 5). It would have been obvious to modify Berger to include detecting means at said predetermined point in order to adjust the power adjusting means to flatten the power levels across the bands at said predetermined point.

With respect to claim 12, Itou teaches detecting means that detect the optical power of the WDM optical signals that include a shortest-wavelength channel (figures 2 and 5).

6. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berger in view of Saeki as applied to claim 4 above, and further in view of Itou, or in the alternative Ma et al. in view of Berger in further in view of Saeki, as applied to claim 4 above, and further in view of Itou.

With respect to claim 11, detecting means at a predetermined point where powers of the respective wavelength bands become approximately identical has not been taught. Itou teaches detecting means at a predetermined point where the respective wavelength channels become approximately identical. Channels are a species that anticipates the bands genus (figure 5 and abstract). It would have been obvious to modify Ma et al. in view of Berger further in view of Ishikawa to include detecting means at said predetermined point in order to adjust the power adjusting means to flatten the power levels across the bands at said predetermined point.

With respect to claim 13, Itou teaches detecting means that detect the optical power of the WDM optical signals that include a shortest-wavelength channel.

7. Claims 16, 17, 26, 27, 28, 29, 30, 32, 35, 36, 39, 41 are rejected under 35 U.S.C. 103(a) as being anticipated by Iwata et al. in view of Berger et al.

With respect to claim 16, Iwata teaches an optical sending apparatus comprising:

a plurality of optical sending means provided for generating WDM optical signals;

a plurality of optical adjusting means connected to said respective optical sending means, for adjusting optical powers of light beams;

wavelength-multiplexing means for wavelength-multiplexing outputs of said respective optical adjusting means; and

control means for performing control so that an output of optical adjusting means for adjusting optical power is pre-emphasized so the output of optical adjusting means compensates for adjustments due to propagation through the optical fiber, see column 14, lines 26-34.

Iwata et al. fails to explicitly teach controlling so that the short-wavelength-signals are output at greater power than the long-wavelength signals. Berger et al. teach pre-emphasis of signals to compensate for Raman shift by adjusting the powers so that the short-wavelength-signals are output with greater power than the long-wavelength signals (column 1, lines 51-55). It would have been obvious

to modify Iwata et al. by controlling the pre-emphasis, to compensate for Raman gain, to output short-wavelength-signals with greater power than the power of the output of the long-wavelength signals.

With respect to claims 17 and 30, Iwata teaches controlling means that controls the outputs of said respective optical adjusting means so that optical powers of the respective wavelength light at a predetermined point will become approximately identical when output light of said wavelength-multiplexing means travels to the predetermined point.

With respect to claim 26 and 33, Iwata teaches a plurality of optical sending means that generate a WDM signal by generating a plurality of optical signals and wavelength-multiplexing said plurality of signals (figure 1).

With respect to claim 29, refer back to the rejection of claim 16, Iwata also teaches an optical transmission line and wavelength-demultiplexing means for demultiplexing the WDM signal.

With respect to claim 41, Iwata teaches making optical power of a WDM optical signal in a shorter-wavelength band larger than optical power of a WDM optical signal in a longer-wavelength band among a plurality of WDM optical signals in respective wavelength bands (column 2, lines 30-34); and

inputting said plurality of WDM optical signals in the respective wavelength bands to an optical transmission line (figure 1).

8. Claims 18 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Saeki.

Iwata fails to teach eliminating noise powers. Subtracting noise power from the average power per signal wavelength teaches eliminating noise powers. It would have been obvious to modify Iwata in view of Ishikawa in order to improve the signal to noise ratio (SNR).

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Berger.

   Iwata fails to explicitly teach compensating for Raman scattering. Berger teaches pre-emphasis to compensate for Raman scattering. It would have been obvious to modify Iwata to compensate for Raman scattering to equalize the SNR for each signal.

10. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Toyohara.

    Iwata fails to teach a system where the number of signals may be increased or decreased. Toyohara teaches a system where the number of channels in a WDM signal may be increased or decreased. It would have been obvious to modify Iwata in view of Toyohara in order to vary the number of channels in the WDM signal.

11. Claims 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Taga. Iwata fails to teach detecting at a predetermined point where optical powers are approximately identical. Taga teaches feedback from a predetermined point. It would have been obvious to modify Iwata in view of Taga to use detecting means at the predetermined point and use control means based

on said detecting means in order to have the control based on real data rather than predicted results.

12. Claims 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Ishikawa, as applied to claim 18 above, and further in view of Taga. Iwata in view of Ishikawa fails to teach detecting at a predetermined point where optical powers are approximately identical. Taga teaches feedback from a predetermined point. It would have been obvious to modify Iwata in view of Taga to use detecting means at the predetermined point and use control means based on said detecting means in order to have the control based on real data rather than predicted results.

13. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata.

Iwata teaches the use of a spectrum analyzer in receiving optical signals. A spectrum analyzer is well known in the art as a device for processing signals received from a transmission system.

14. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Ma et al.

With respect to claim 39, Iwata fails to teach amplifying WDM bands separately. Ma et al. teaches amplifying WDM bands separately. It would have been obvious to modify Iwata's method in to amplify WDM bands separately for the purpose of gain flattening.

15. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwata in view of Ma et al. as applied to claim 39 above, and further in view of Berger.

Determining a difference between outputs has not been taught. Berger teaches determining an output and adjusting the outputs based on a comparison of the said outputs.

Response to Arguments

Applicant's arguments filed 12-10-02 have been fully considered but they are not persuasive.

With respect to claims 1, 3, 5, 14, and 15, the applicant argues that neither the Berger et al. nor Ma et al. teach the amplifier control as claimed. The argument elaborates that the

> control is performed so that an output of optical adjusting means for adjusting average optical power per single wavelength channel of shorter-wavelength-band light among a plurality of optical adjusting means becomes larger than an output of optical adjusting means for adjusting average optical power per single wavelength channel of longer-wavelength-band light among the plurality of optical adjusting means.

This control scheme is clearly taught in the Berger reference. Specifically the Berger reference teaches controlling the amplifier by pre-emphasis of signal wavelength to thus compensate for Raman shifting in the transmission line. Raman shifting transfers energy from short wavelength light to longer wavelength light. Pre-emphasis controls the signal light powers so that initially short wavelength light has higher power than longer wavelength light so that as the multiplexed lights propagate through the transmission line the higher power short wavelength light transfers power to energy to

lower power longer wavelength light resulting in equal power across the signal spectrum at the end of the span.

With respect to claims 16, 17, 26-30, 32, 35, 36, 39, and 41, Berger et al. teaches the controlling means described above. Furthermore Iwata also teaches pre-emphasis for flattening the signal to noise ratio across the signal spectrum.

The arguments presented for claim 4 are moot in view of the new grounds of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yang et al. (6,198,571) and Hentschel et al. (5,696,707) teach subtracting noise power from detected signal for amplifier control. Suzuki et al. (4,945,531) teaches a parallel band optical filter.

The examiner notes that the inter-wavelength-band pre-emphasis depicted in figure 3a may distinguish over the prior art. Claim amendments must be worded so that the limitations can not be construed to meet the criteria for standard pre-emphasis of channels. Suggested limitations include:

at least two mutually exclusive wavelength bands;

each wavelength band containing at least two channels;

wavelengths of a respective band having approximately equal channel powers; and

approximate channel powers of shorter wavelength bands being greater than the approximate channel powers of longer wavelength bands.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 703-305-8233. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

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May 29, 2003

THOMAS G. BLACK
SUPERVISORY PATENT EXAMINER
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